



## Potential factors impacting health-related quality of life among patients with epilepsy: Results from the United Arab Emirates



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### ABSTRACT

**Purpose:** to investigate potential factors impacting HRQOL among PWE at a medical facility in the UAE.

**Methods:** Depression, anxiety, and health-related quality of life were assessed in 160 adult patients with epilepsy from September 2014 to January 2015 at Sheikh Khalifa Medical City (SKMC). The World Health Organization Quality of Life abbreviated scale (WHOQOL-BREF), the Patient Health Questionnaire nine-item (PHQ-9) depression scale, and Generalized Anxiety Disorder seven-item (GAD-7) scale were administered. Demographic details including psychosocial factors were also obtained. Clinical details including seizure freedom, epilepsy type, epilepsy duration, and magnetic resonance imaging (MRI) results were recorded. Multivariate analysis was used to look at significant variables associated with HRQOL.

**Results:** Depression, anxiety, seizure freedom, and the use of anti-depressants had significant positive correlation with HRQOL in univariate analysis. However, depression, followed by seizure freedom, had the strongest association with HRQOL in a multivariate regression analysis.

**Conclusion:** Depression and seizure freedom, followed by anxiety and anti-depressants use, were significantly correlated with HRQOL. These results underscore the importance of screening for psychiatric comorbidities in patients with epilepsy.

**Implications:** Screening for comorbid psychiatric disorders should be an essential component of the standard of care, and incorporated in the treatment plan for all patients with epilepsy. Factors contributing to psychiatric symptoms among PWE, such as maladaptive illness perceptions, non-adherence to anti-epileptic drugs (AED), and social stigma should be carefully addressed to achieve an optimal health-care plan.

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### 1. Introduction

With an approximate 50 million people living with epilepsy worldwide [1], studies are continuously looking at ways of improving the diagnosis and treatment of this chronic neurological disorder. Factors that aggravate, and negatively impact the health condition and quality of life of patients with epilepsy (PWE) include comorbid psychiatric illnesses such as depression and anxiety [2,3]. Research shows that people with epilepsy (PWE) are

two to four times more likely to suffer from psychiatric comorbidity than the general population [2,3,4]. Several studies have demonstrated the negative impact of psychiatric illnesses in PWE, affecting their general quality of life [3,5–9]. In a systematic review of 93 studies on multiple predictors of HRQOL among PWE, Taylor et al found that depression and anxiety, along with seizure frequency, appeared to be consistently predictive of poor levels of HRQOL [10]. This review underscores the importance of early detection and appropriate interventions for psychiatric comorbidity. Findings also indicate that psychiatric comorbidities contribute to 30–35% of the variance in HRQOL when compared with clinical factors such as seizure frequency and severity, which account up to only 20% [11–13].

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Potential factors mediating the relationship between psychiatric symptoms and HRQOL in PWE are found to be maladaptive illness perceptions, social stigma, and non-adherence to anti-epileptic drugs (AEDs) [7,9,14,15,16,17,18]. These factors emanate from inadequate knowledge of the illness and its chronic nature; PWE view epilepsy negatively, and they are also less likely to communicate their feelings and concerns with others [18]. It is reported that 30–50% of PWE do not regularly take their AEDs for various reasons, including social stigma associated with taking antiepileptic therapies [17]. This, in turn, exacerbates seizure frequency, increases hospitalizations and higher health-care system costs, and results in higher risk of morbidity and mortality [17]. Such studies highlight the importance of investigating factors such as psychiatric comorbidity that negatively impact HRQOL in PWE, which can in turn inform decisions made towards prevention, treatment, and rehabilitation encompassing all aspects of the disease.

In the last decade, more attention has been given to the general study of epilepsy in the Middle East. Regional as well as local research concerning epilepsy, psychiatric illnesses, and quality of life has been carried out in Egypt, Jordan, Oman, and the UAE [5,8,19,20,21,22]. These studies collectively looked at the epidemiological nature of epilepsy, as well as factors impacting the general quality of life in PWE. In a replicate review study, al-Khateeb and al-Khateeb investigated psychosocial aspects of epilepsy in ten Arab countries. The UAE came third in place, along with Bahrain and Lebanon, in terms of patients having the highest perception of quality of life. However, a study on HRQOL in the UAE among PWE found epilepsy and its treatment having a significant impact on their social and psychological well-being, with most reporting experiences of stigmatization [23]. In addition, a study by Bener et al found that knowledge and attitude towards epilepsy in the UAE was generally poor and negative, with the majority of participants lacking awareness about causes and treatment options [24]. Furthermore, a study on prevalence of depression and anxiety among PWE in the UAE found PWE having higher rates of depression and anxiety when compared with a control group [5]. To the authors' knowledge, these are the only studies conducted on epilepsy and PWE in the UAE, and psychosocial factors affecting HRQOL remain heavily under-investigated. An update on research investigating epilepsy and HRQOL is significantly needed. The objective of this study, therefore, was to determine the primary predictors of HRQOL in PWE, investigating multiple variables including depression and anxiety symptoms. Age, sex, marital status, and education level were included as demographic variables. Clinical factors included seizure freedom, epilepsy type, epilepsy duration, anti-epileptic drug (AED) use, and MRI results. Following previous studies' findings, it was hypothesized that depression and anxiety would be the primary predictors of lower HRQOL among PWE.

## 2. Materials and methods

The study received approval from the Shaikh Khalifa Medical Institute ethics board, and informed consent form was obtained from each participating patient.

### 2.1. Participants

One Hundred Sixty patients (M/F=65/95) (mean age=33.0, SD=10.1 years), attending the SKMC outpatient clinic over a four-month period were approached for the study. Participating patients were asked to complete the validated WHOQOL-BREF [25], the validated PHQ-9 and the GAD-7 questionnaires [26,27]. The English versions, as well as the validated Arabic versions of both questionnaires were used [28].

### 2.2. Questionnaires

The Patient Health Questionnaire nine-item depression scale (PHQ-9), used in this study is a brief, self-administered tool for the screening and diagnosis of depression. It is based on the nine DSM-IV criteria of depression, and is sensitive to change in depression scores over time. A score of >10 on the PHQ-9 is indicative of the presence of depression. It can therefore be used to monitor response to therapy in this population. The PHQ-9 Depression Scale has been validated in the general as well as in the PWE population [26,29].

The Generalized Anxiety Disorder Scale (GAD-7) was adopted to screen for anxiety disorder. It consists of a brief, seven-item questionnaire that takes less than three minutes to complete, unlike other screening tools widely used in clinical settings that are time consuming. A score of >10 on the GAD-7 is indicative of the presence of Generalized Anxiety Disorder. It has been validated for use in both the general and in the PWE population [27,30].

The WHOQOL-BREF questionnaire was also administered to assess HRQOL [25]. Although not validated for use on the PWE population, this measure was chosen because it was the only standardized HRQOL measure in Arabic known to the authors at the time of conducting the study. It is composed of 26 questions, distributed into four domains. Each domain considers several aspects: A) Physical Domain: pain/discomfort/energy/fatigue/sleep/rest; B) Psychological Domain: feelings/appearance self-esteem/memory and concentration; C) Social Relations Domain: social relations/social support/sexual activity; D) Environment Domain: safety/home environment/finances/leisure/transport/social care. The mean scores of each domain are calculated and reported as they are, with scores ranging between four and 20. In addition to the four domains, the WHOQOL-BREF also has two separate questions to address satisfaction with health and participants' rated QOL. These two questions are scored on a five-point Likert scale, ranging between 'very poor' and 'very good' [31].

### 2.3. Procedure

The patients were approached for participation before their assessment in the consultation room and were asked for their informed consent. Inclusion criteria included age (18–65) and confirmed diagnosis of epilepsy. The study included patients visiting the clinic for the first time, including those newly diagnosed, as well as patients on a routine follow-up visit. Exclusion criteria included patients with a progressive cognitive deficit who might be incapable of signing the informed consent form. Demographic data were recorded, including age, sex, marital status, and education level. Clinical data was also recorded including seizure type, seizure duration, seizure freedom, anti-epileptic drug (AED) use, magnetic resonance imaging (MRI) findings, and use of antidepressants. Seizure type was recorded based on available clinical evidence including results of video/electroencephalogram (EEG) telemetry. Epilepsy diagnosis was classified as 'undetermined' when the available data were not adequate to make an accurate classification. Epilepsy duration was determined based on two groups: patients who have had epilepsy for less than five years and patients who have had them for longer than five years. This classification was done based on a previous study which used similar design [5]. Similar to other studies in the literature, patients were considered seizure-free if they had no seizures, including simple partial seizures (aura), in the previous six months prior to their clinic visit [32,33]. All patients had an epilepsy protocol brain MRI, which is a standard protocol for patients presenting to the epilepsy clinic. Patients were subdivided according to their MRI findings as either epileptogenic if they had

lesional epilepsy or if their MRI showed mesial temporal sclerosis, or non-epileptogenic if they had normal MRI.

#### 2.4. Statistical analysis

Descriptive statistics including mean and standard deviation were calculated for continuous variables. For categorical variables, frequencies with percentages were reported. Since our main goal was to assess for factors significantly associated with HRQOL in PWE, we initially performed independent sample *t*-tests between the means of the dependent variable HRQOL stratified by the categorical variables (sex, marital status, educational level, epilepsy type, epilepsy duration, seizure freedom, type of AED use, MRI findings, and anti-depressant use). Similarly, and in case of continuous independent variables (age, PHQ-9, GAD-7), linear correlation analyses were performed with HRQOL.

For the multivariate analysis, a stepwise forward multivariate linear regression analysis was performed to detect which variables were associated with HRQOL. The *p*-value specified for entry in the multivariate models was 0.05 and for removal from the model was 0.1. The alpha level for all tests of hypotheses of no effect was set to 0.05. The effect size (standardized coefficient) for the individual variables found to be significant in the multivariate model was calculated.

**Table 1**  
Sociodemographic information, seizure-related features, and psychiatric assessments of patients.

	Total (n=160) %
Age (18–65), mean ± SD	33 (10.1)
Sex	
Female	95 (56%)
Males	65 (44%)
Marital status	
Married	87 (54.4)
Not Married	83 (45.6)
Duration of epilepsy	
<5	118 (73.8%)
>5	42 (26.2%)
Type of epilepsy	
Localization related	96 (60%)
Generalized	60 (37.5%)
Uncertain	4 (2.5%)
MRI Findings	
Epileptogenic	37 (23.1%)
Non Epileptogenic	123 (76.9%)
Epilepsy control status	
Controlled epilepsy	115 (71.9%)
Uncontrolled epilepsy	45 (28.1%)
AEDs use	
One AED	87
2 AED	49
3 AED	12
No AED	11
Depression	
Present	43 (26.9%)
Absent	117 (73.1%)
Anxiety	
Present	40 (25%)
Absent	120 (75%)
Antidepressant use	
Yes	25 (15.6)
No	135 (84.4%)

### 3. Results

The sociodemographic and clinical variables of the enrolled patients are summarized in Table 1. The mean HRQOL for the 160 patients was 93.31 (SD = 17.34). Among all the categorical variables evaluated in the univariate analysis, the use of antidepressants and seizure freedom were the only variables associated with HRQOL.

Forty five patients experienced persistent seizures with mean HRQOL of 87.0 compared with 115 seizure-free patients whose mean HRQOL was 95.8 ( $P=0.003$ ). Similarly, in the 25 patients on antidepressants, the mean HRQOL measure was 81.6 compared to 95.5 in the remaining 135 patients ( $P=0.005$ ).

In addition, both PHQ-9 score (R squared = 0.41,  $P=0.0000$ ) and GAD-7 score (R squared = 0.32,  $P=0.0000$ ) were significantly linearly correlated with HRQOL in univariate analysis. A significant linear correlation was found between PHQ9 and GAD7 (R squared = 0.564,  $P<0.001$ ). However, there was no significant correlation between age and HRQOL (R squared < 0.0001,  $P=0.93$ ).

However, on multivariate regression analysis, only PHQ9 ( $p<0.001$ ) scores and seizure freedom ( $P=0.012$ ) were associated with HRQOL (Tables 2 and 3). The standardized coefficients ( $\beta$  coefficients) for PHQ9 and seizure freedom were  $-0.473$  and  $-0.154$  respectively, indicating that PHQ9 was the more important variable affecting HRQOL measures.

### 4. Discussion

This study is among the first few in the Middle East to explore potential factors impacting HRQOL in PWE including, psychological, demographic, and clinical variables. Our results support previous findings which determined depression as the strongest predictor of HRQOL, as compared to anxiety and the various demographic and clinical variables investigated [5,7,8,13]. Moreover, corroborating a previous finding [34], depression was found to have a direct, non-mediated impact on HRQOL. The study found unemployment having no statistically significant impact on HRQOL, which supports the findings of a previous study [8]. The type of AED use (monotherapy versus polytherapy) did not yield a significant result. Other studies, such as Ettinger et al's looked at AED non-adherence as a variable, as opposed to whether or not patients were taking single or multiple AEDs at the time [7].

In line with this study's significant finding that depression is one of the two strongest predictors of HRQOL, various studies have proposed possible factors contributing to depression among PWE related to AED non-adherence, maladaptive illness perceptions, and social stigma associated with epilepsy [7,9,14–17]. Research indicates that 30–50% of PWE do not regularly take their AEDs, which in turn increases seizure frequency [17]. This entails increased hospitalization and higher health care costs, which were found to have a direct link to feelings of mood and depressive symptoms [7,17,35,36]. Reasons for AED non-adherence are speculated to include forgetfulness, stigma attached to antiepileptic therapies, side effects related to AEDs, and the sheer burden associated with taking AEDs, especially in polytherapy [37]. These studies highlight the importance of alleviating such contributory factors to AED non-adherence to eliminate chances of depression diagnosis among PWE.

Furthermore, studies which evaluated maladaptive illness perception as a contributory factor found that it strongly mediated the relationship between depression and HRQOL [9,14,15]. Due to the chronicity nature of epilepsy and the social stigma attached to it, patients generally have a negative perception of their illness [7,9,14–16]. It can, therefore, be argued that maladaptive illness perceptions have a direct and important link to depression. Fortunately, maladaptive illness perception as a construct is modifiable and can be significantly reduced or even eliminated

**Table 2**  
Multivariate regression analysis of clinical variables.

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	102.604	2.432		42.196	0.000
Seizure control	5.912	2.315	0.154	2.553	0.012
Use of antidepressant	−1.913	3.111	−0.040	−0.615	0.540
PHQ9	−1.376	0.263	−0.474	−5.241	0.000
GAD7	−0.590	0.302	−0.182	−1.957	0.052

a. Dependent Variable: QOL

using appropriate medical intervention. An example of psychotherapeutic intervention includes cognitive-behavioral and acceptance-based therapy which was found to bring significant differences in patients' pre and post perceptions of epilepsy, and as result, their general perception toward quality of life [15].

Finally, social stigma attached to epilepsy is a driving factor in patients' general behavior and attitude towards their illness. Psychosocial factors such as the ability to drive, employment, education, help seeking behavior, limited visibility of illness, and not belonging to a communal or local support group are all associated with decreased HRQOL in PWE [16]. To this effect, a study with 892 participants (15 years and above) in the UAE by Bener et al found that the public's attitude towards epilepsy is

generally negative, and lack of knowledge about causes and treatment could potentially be the cause for social stigma [24]. Additionally, a study by Baker et al included 3889 PWE across eight countries in the Middle East – including the UAE – and found that epilepsy and its treatment had a negative impact on their social and psychological well-being, as well as stigmatization from the general public [23]. Studies show that those belonging to a support group benefit tremendously by increasing socialization, providing and receiving comfort, and generally finding a safe and trusted space to share common feelings and emotions [16,38]. This could potentially help in alleviating self-stigma of PWE, as well as social stigma directed towards PWE. Moreover, support groups provide members with more knowledge of epilepsy-related issues and equip them with positive attitudes towards the illness. This could in turn alleviate symptoms of depression and improve general quality of life in PWE.

**Table 3**  
Correlational analysis of HRQOL and all measured variables.

	HRQOL (Mean)	P-value
Sex		
Female	91.57	0.137
Males	98.86	
Marital status		
Married	92.9	0.74
Not Married	93.81	
Duration of epilepsy		
<5	91.33	0.39
>5	94.02	
Type of epilepsy		
Localization related	94.89	0.353
Generalized	90.77	
Uncertain	93.5	
MRI Findings		
Epileptogenic	96.22	0.25
Non Epileptogenic	92.44	
Epilepsy control status		
Controlled epilepsy	87	0.003
Uncontrolled epilepsy	95.8	
AEDs use		
One AED	95.09	0.16
2 AED	94.08	
3 AED	85	
No AED	86.55	
Depression		
Present	80.81	< 0.001
Absent	97.07	
Anxiety		
Present	78.8	< 0.001
Absent	98	
Antidepressant use		
Yes	81.56	0.005
No	95.49	

#### 4.1. Limitations

There are some limitations to the study. Generalizability is limited due to it being a single-centered study. Future studies in the UAE could design a multi-centered study for better generalizability options. Differences in seizure frequency between patients were not accounted for when measuring seizure freedom, and this may arguably impact HRQOL. However, our decision was based on a study which found that seizure frequency had no impact on patients' quality of life [13]. The main limitation of this study is the use of WHOQOL-Bref, which is not very commonly used in epilepsy-related research. Previous studies have typically used the QOLIE-10 [39] or QOLIE-31 [40] to assess HRQOL in PWE. The WHOQOL- was chosen only because it was the only Arabic HRQOL measure available at the time of conducting the study. As such, content validity may certainly come into question, and results may not be well indicative of epilepsy-related QOL as a construct.

#### 5. Conclusion

This study investigated potential factors that could impact HRQOL among PWE in the UAE, and found depression, anxiety, anti-depressants use, and seizure freedom were significantly correlated with HRQOL. The results indicate that psychiatric comorbidity plays a significant role in affecting HRQOL, and its timely screening and intervention should be given importance in the standard care provided to PWE.

#### 6. Implications

This study underscores the importance of screening for psychiatric disorders among PWE for a proper and timely diagnosis of psychiatry comorbidity with epilepsy. The treatment of epilepsy should use a holistic approach by using time and cost effective screening tools for psychological illnesses. Factors that are indicated to improve general quality of life among PWE should

be considered in treatment plans. Health care providers should encourage patients to register at local and communal support groups to rip benefits such as awareness, education, positive illness perceptions, socialization, and less stigmatization.

### Conflict of interest

All authors declare no conflict of interest.

### Ethics approval

The study was granted ethics approval by the Shaikh Khalifa Medical City ethics board.

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The study did not receive any financial/material support.

### Informed consent

Informed consent was obtained from all individual participants included in the study.

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